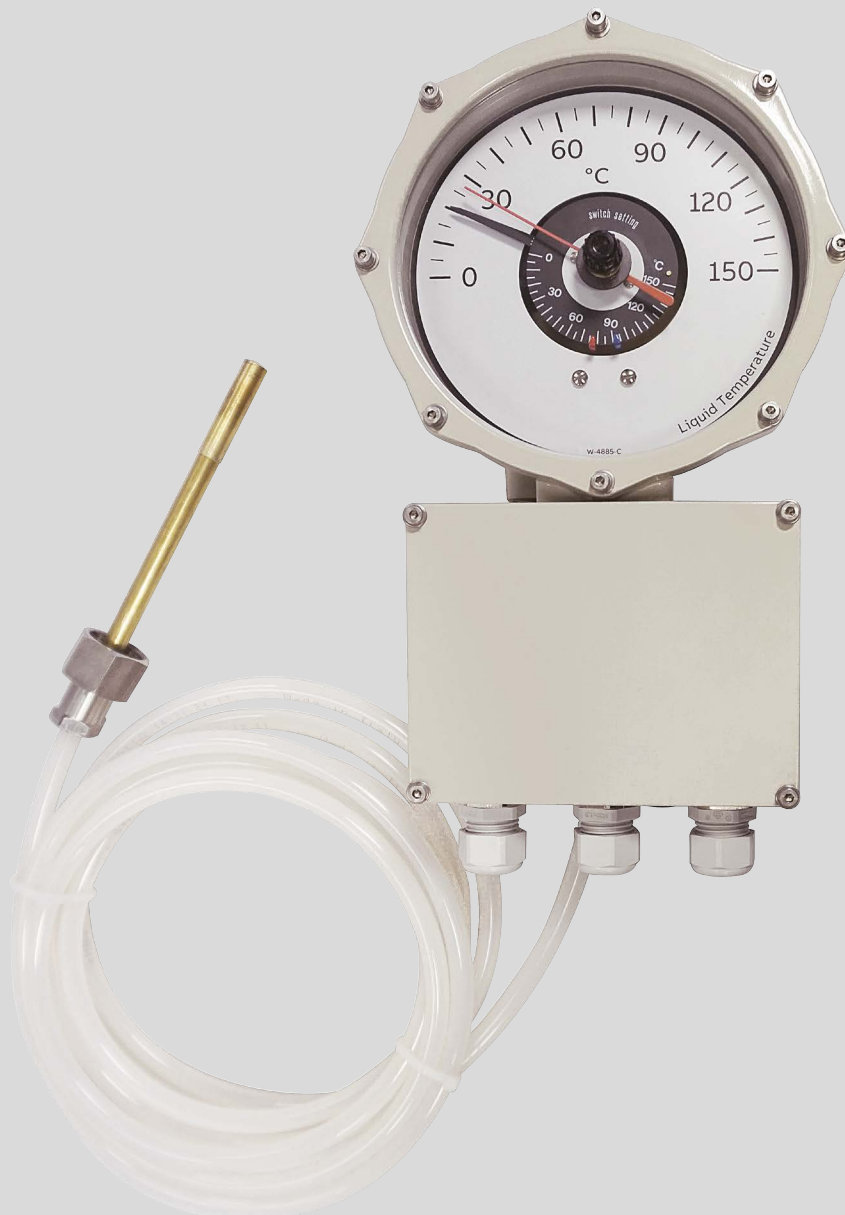


TECHNICAL GUIDE

Temperature indicators



Content index

Application	4	Bulbs.....	10
Technical data	5	Electrical scheme	12
Dimensions.....	8	Order sheet.....	14
Mounting type	9	Overlapping switches	18

Application

Temperature indicators in oil / IEC

	Features	Liquid temperature indicators	Winding temperature indicators
Standard configuration	Type	OTI / eOTI	WTI / eWTI
	Scale	-50 °C / +150 °C, -20 °C / +140 °C, 0 °C / +150 °C, 0 °C / +160 °C	
	Dial protection	Polycarbonate	Polycarbonate
	CT nominal current	-	1, 2, and 5A
	Ventilation System	YES	YES
	Micro switches	2 or 4	2 or 4
	Capillary length	up to 18 m	up to 18 m
	Max pointer	Yes	Yes
Options	PT100	Up to 2	Up to 2
	Vibration damping	Available	Available
	MBO contacts	Available (up to 4)	Available (up to 4)
	Analog output 4-20 mA	Embedded (eOTI) or external transducer	Embedded (eWTI) or external transducer
	Digital output Modbus RTU	Embedded (eOTI)	Embedded (eWTI)
	Dial protection	Glass	Glass
	Thermal well	Available	Available

Temperature indicators in air / ANSI

	Features	Liquid temperature indicators	Winding temperature indicators
Standard configuration	Type	ATI/eATI/ATIw	AWTI/eAWTI
	Scale	From 0°C up to +120°C	From 0°C up to +180°C
	Dial protection	Polycarbonate	Polycarbonate
	CT nominal current	-	1, 2, and 5A
	Ventilation System	YES	YES
	Micro switches	2 or 4	2 or 4
	Capillary length	up to 394" (10 m)	up to 394" (10 m)
	Max pointer	Yes	Yes
Options	PT100	Up to 2	Up to 2
	Vibration damping	Available	Available
	Analog output 4-20 mA	Embedded or external transducer	Embedded or external transducer
	Digital output Modbus RTU	Embedded (eATI/ eATIw)	Embedded (eAWTI)
	Dial protection	Glass	Glass
	Thermal well	Available	Available

Technical data

Temperature Indicators	Technical data
Material	
Housing	Aluminum casting, RAL 7032, powder coated (C4); Off shore model on request (C5-M surface treatment, not painted)
Dial protection	Polycarbonate (standard) / Glass (optional)
Max pointer	Standard
Temperature sensor	Brass
Temperature sensor protection	Brass
Capillary tube (in oil / IEC)	Copper capillary tube with Rilsan protection (standard) or stainless steel protection (optional)
Cable gland (in oil / IEC)	3; M25 x 1.5 made of plastic (C4) or nickel-plated brass (C5-M)
Capillary tube (in air / ANSI)	Stainless steel protection (standard) or copper capillary tube with Rilsan protection (optional)
Cable gland (in air / ANSI)	3 NPT

Characteristics data	
Standard	IEC 60076-22-1
Installation	Indoors and outdoors, tropical proof
Ambient temperature	-40 °C to 80 °C (-40 °F to 176 °F) (for lower temperature range please contact COMEM)
Winding temperature indicator with internal heating element	Standard for all except ATlw
Nominal current availability	1 A, 2 A and 5 A
Degree of protection	IP66 in accordance with EN60529
Measuring range in oil / IEC	-50 °C / +150 °C, -20 °C / +140 °C, 0 °C / +150 °C, 0 °C / +160 °C
Measuring range in air / ANSI	0 °C / +120 °C for ATI, eATI and 0 °C / +180 °C for ATlw, eATlw, AWTI, eAWTI,
Measuring accuracy	1.5 % of Full Scale
Ventilation	Ventilation system to prevent condensation (C4 plastic valve; C5 stainless steel valve)
Wires	Min 0.25 mm ² / Max 2.5 mm ² (Comem eOTI/eWTI) - Min 0.33 mm ² / Max 4 mm ² (OTI/WTI)
Vibration damping	Optional anti-vibration supports available
Sinusoidal (EN 60721-3-4)	cl 4M4: 2-9 Hz (6 mm peak to peak), 9-200 Hz (1g) - All axis
Shock	cl 4M4: 10g (11 ms) in all the directions (EN 60721-3-4)

Standard micro switches	
Number and types	2 or 4 adjustable change over switches
Contact load	ac: 250V / 5A / cosΦ=1, dc: 250V / 0.25A, 125V / 0.5A, 50V / 1A, 30V / 5A (non-inductive) (On customers request can be provide contacts with higher performances see pag. 3)
Minimum switching distance	4% Full Scale .
Rated insulation voltage	2.5 kV ac/1 min, terminals to ground
Switching accuracy	2% of Full Scale
Commutation differential	4% of Full Scale
Rated insulation voltage	2.5 kV ac 1 min between contacts and earth, 1.0 kV ac 1 min between open contacts
PT100	Max no. 2 ; 3 wires

Technical data

Higher performances micro switches

Number and types	2 or 4 adjustable change over switches
Contact load	ac: 250 V / 10A / $\cos\Phi=1$ dc: 250 V / 0.25A, 125 V / 0.5A, 50 V / 3A, 30 V / 10A (non-inductive)
Measuring accuracy	1.5% of Full Scale
Switching accuracy	2% of Full Scale
Commutation differential	4% of Full Scale
PT100	Max no. 2 ; 3 wires

MBO contact (for IEC only)

Number and types	2 or 4 adjustable change over switches
Contact load	ac/dc: 250 V / 3A, 125 V / 10A (non-inductive)
Measuring accuracy	± 3 °C between 30-150 °C
Switching accuracy	± 4 °C between the range 30-150 °C
Resetting tolerance	10 ± 2 °C
PT100	Max no. 2 ; 3 wires

eDevices (eOTI / eWTI / eATI / eWTI / eATIw)

Analog output (embedded in the eDevice)	
Supply voltage	24 V ± 10 % dc polarized (protected against pole reversal) Active passive loop
Output signal	4 - 20 mA
Measure Accuracy	1.5 % of Full Scale
Measuring range	In agreement with the indicator scale
Rated insulation voltage	2 kV ac, 1 min, terminals to ground
Maximum resistance	700 Ω at 24 V dc
Power consumption	0.5 W
Max distance for analogical output	Max 30 m / 98 ft (for different request contact COMEM)
Wires	Max 2.5 mm ² – advised 4x1 mm ² o 6x1 mm ² shielded twisted pair cable for analog/digital output

Analog and digital output (embedded in the eDevice)

Supply voltage	24 V ± 10 % dc polarized (protected against pole reversal) Active current loop
Output signal	4 - 20 mA and RS485 Modbus RTU
Measure Accuracy	1.5 % of Full Scale
Measuring range	In agreement with the indicator scale (only for analog output)
Rated insulation voltage	2 kV ac, 1 min, terminals to ground
Maximum resistance	450 Ω at 24 V dc
Power consumption	0.5 W
Max distance for analogical output	Max 30 m / 98 ft (for different request contact COMEM)
Wires	Max 2.5 mm ² – advised 4x1 mm ² o 6x1 mm ² shielded twisted pair cable for analog/digital output

External trasducer MP88800

Supply voltage	24 V dc $\pm 10\%$ Passive current loop
Output signal	4-20 mA
Measuring range	In agreement with the indicator scale (only for analog output)
Rated insulation voltage	2 kV ac, 1 min, terminals to ground
Maximum resistance	700 Ω at 24 V dc
Power consumption	0.5 W

External trasducer Nokeval 6740 (galvanic insulation):

Supply voltage	24 V dc $\pm 10\%$ Active current loop
Output signal	0-20 mA, 4-20 mA, 0-5V, 0-10V
Measuring range	In agreement with the indicator scale (only for analog output)
Rated insulation voltage	2 kV ac, 1 min, terminals to ground
Maximum resistance	500 Ω at 24 V dc
Power consumption	0.5 W

Temperature display for remote visualization: C40

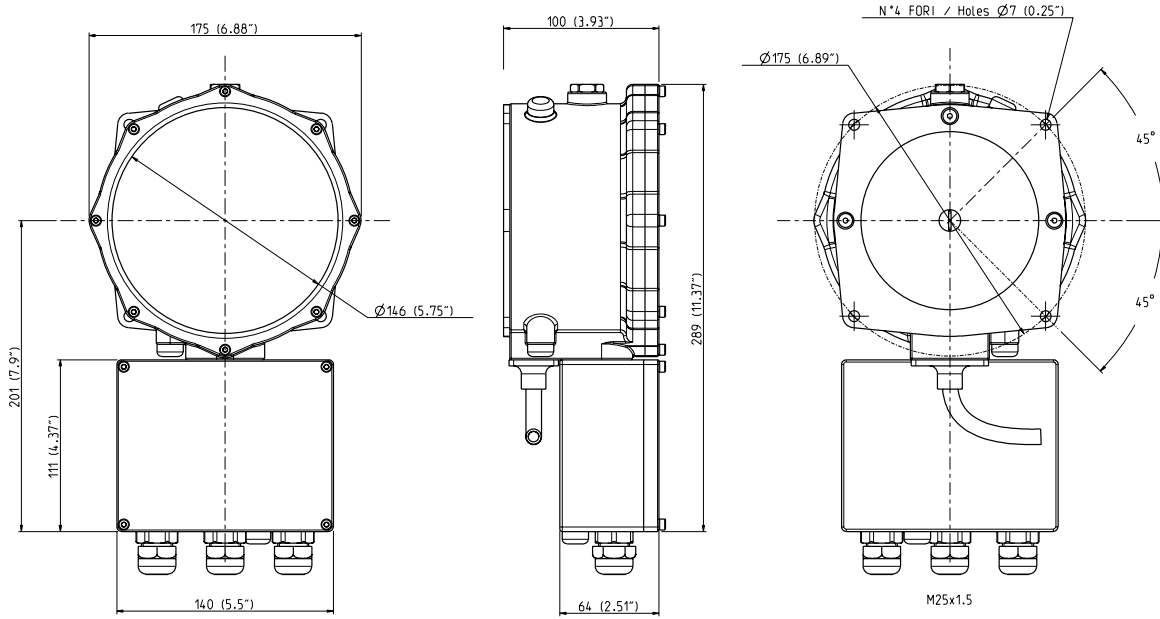
Supply voltage	18 to 265 V ac/dc
Input	4-20 mA
Power consumption	<1.5 W

Power supply: DRA 18

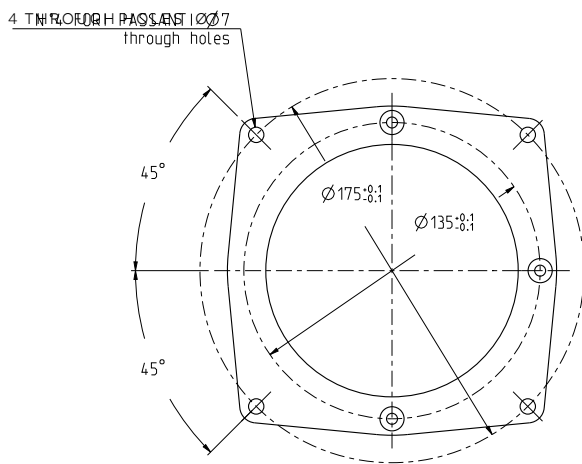
Input supply voltage	90 to 260 V ac/dc
Output voltage	24 V dc
Power consumption	18W
Assembly	DIN RAIL

Dimensions

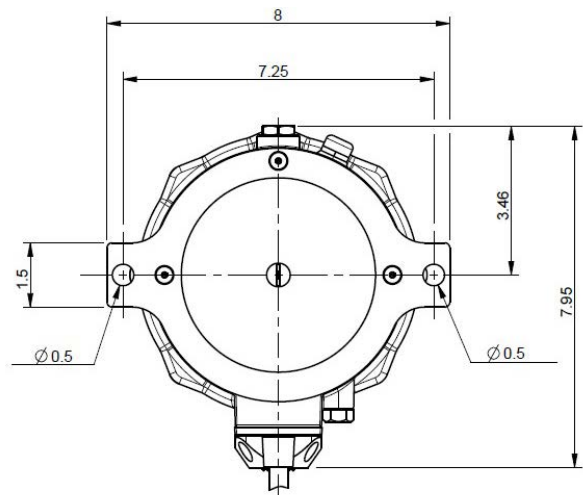
Liquid and winding temperature indicators



Flange connection (Type F)

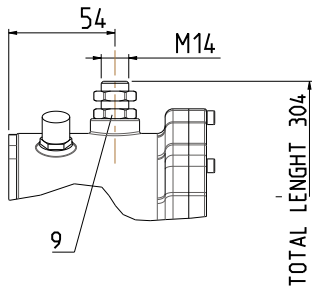


Flange connection (Type Q)

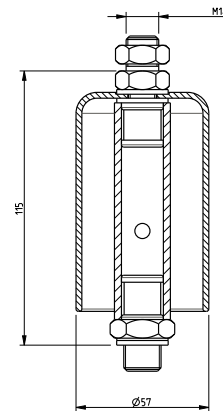
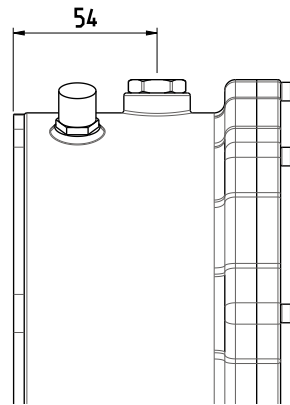


Mounting type

Rigid screw (Type R)



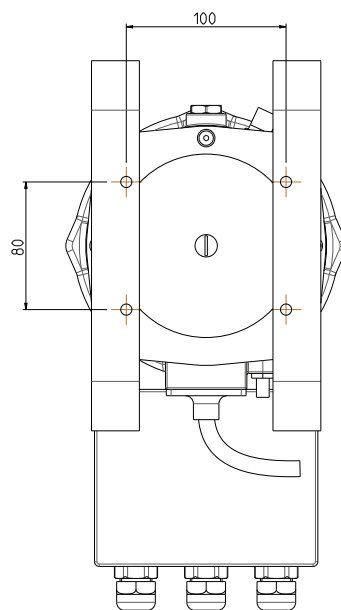
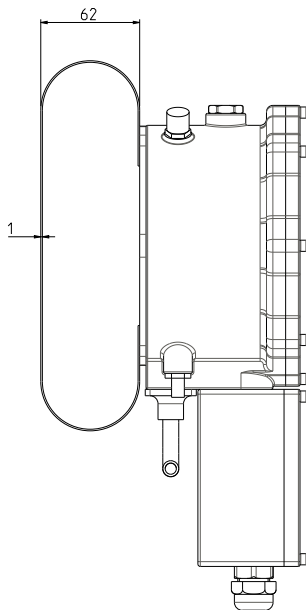
Elastic suspension (Type ES)



Unscrew the upper rigid locking M14 screw located on the top of the thermometer

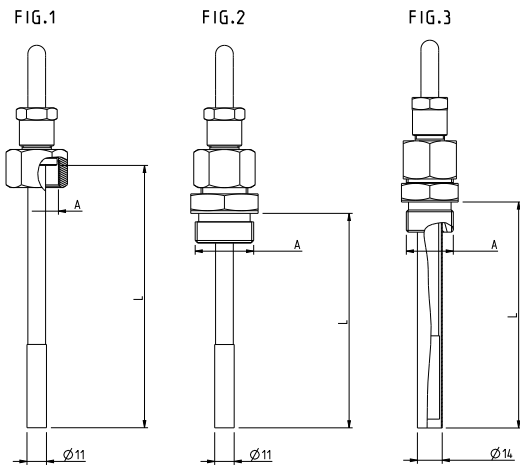
Assembly the elastic suspension on the top of the thermometer with a M14 screw that let install the instrument in the plant

Back metallic sheets (Type V)



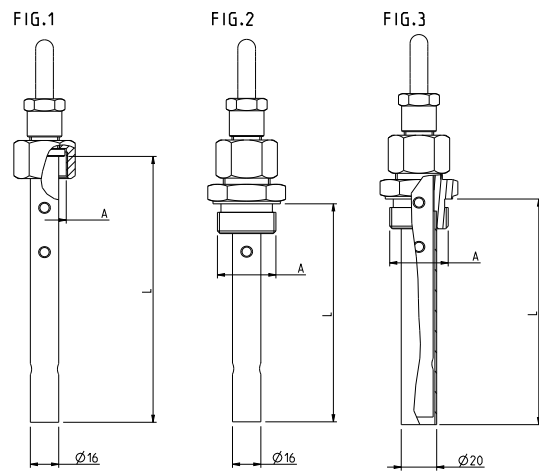
Bulbs for types in oil / IEC

Liquid temperature indicator Comem OTI



OTI

Fig. 1				
A	3/4" BSP	1/2" BSP		
L	Min 80 mm / Std. 150 mm			
A Fig. 2/3				
	3/4" BSP	1/2" BSP	1" BSP	M27x2 M22x1.5
L	Min 80 mm / Std. 150 mm			



OTI equipped with PT100 sensor

Fig. 1				
A	3/4" BSP			
L	Min 150 mm / Std. 150 mm			
A Fig. 2/3				
	3/4" BSP	1" BSP	M27x2	M22x1.5
L	Min 120 mm / Std. 150 mm			

Winding temperature indicator Comem WT1

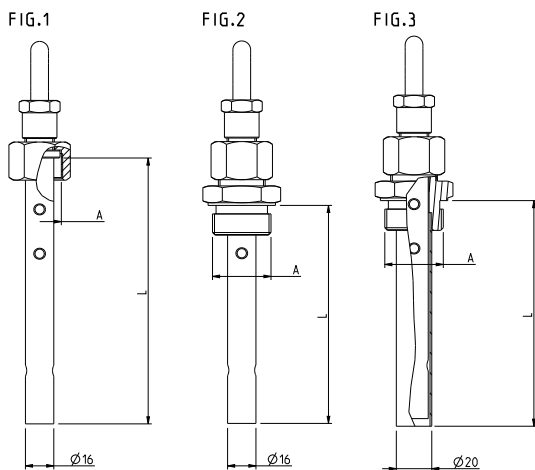


Fig. 1				
A	3/4" BSP			
L	Std. 150 mm			
A Fig. 2/3				
	3/4" BSP	1" BSP	M27x2	M22x1.5
L	Min 120 mm / Std. 150 mm			

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Bulbs for types in air / ANSI

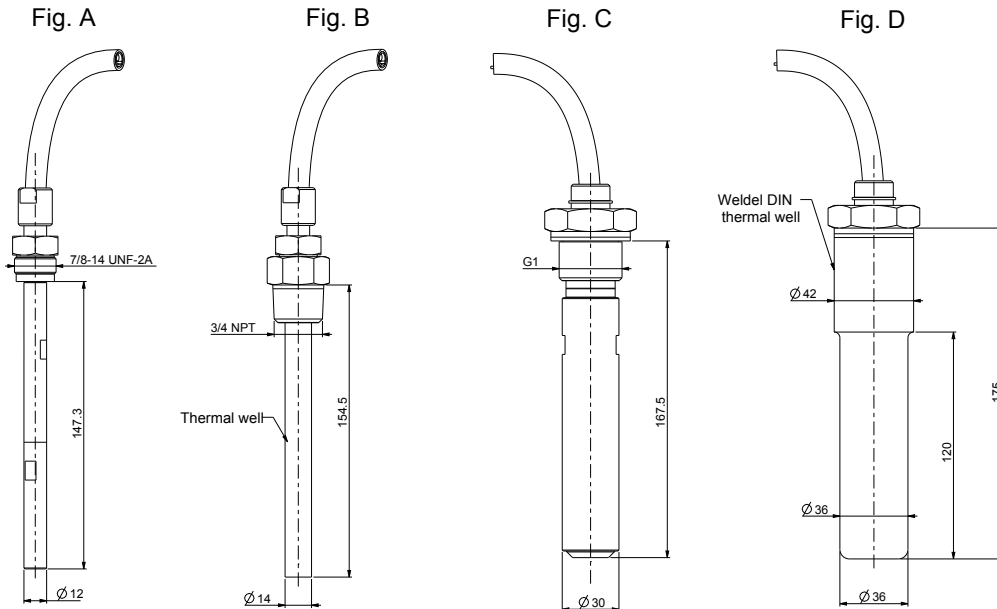
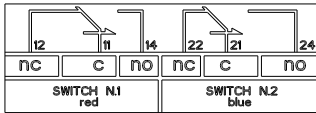


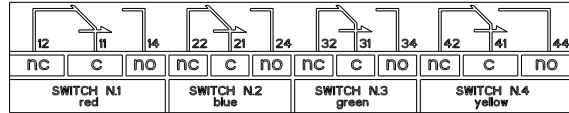
Fig.	Temperature indicator type	PT100 sensors
A	ATI / eATI / ATlw / eATlw (bulb)	max n. 1
B	ATI / eATI / ATlw / eATlw (bulb + thermal well)	max n. 1
C	ATI / eATI with PT100 sensors / AWTI / eAWTI (bulb)	max n. 2
D	ATI / eATI with PT100 sensors / AWTI / eAWTI (bulb + thermal well)	max n. 2

Electrical scheme

Liquid temperature indicator with cable box

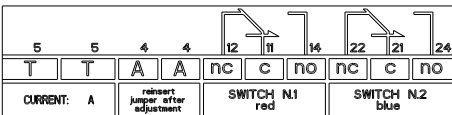


2 contacts

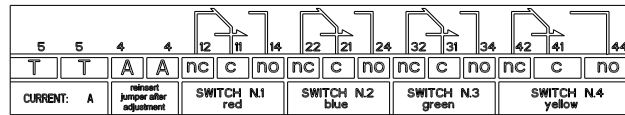


4 contacts

Winding temperature indicator with cable box

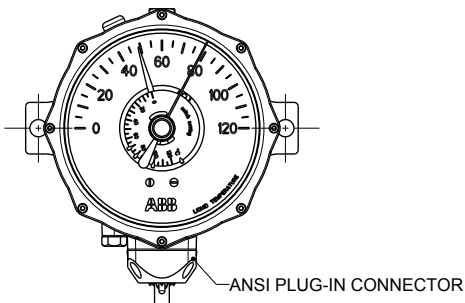


2 contacts



4 contacts

Plug-in connection



Liquid temperature indicator with plug-in connection (type ANSI)

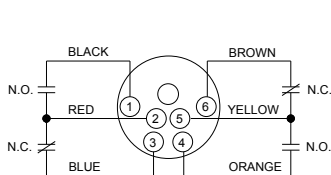


Fig.1

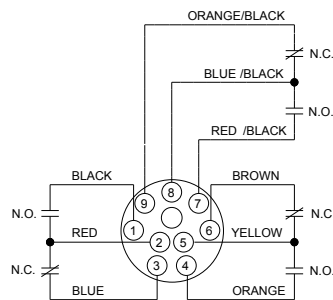


Fig.2

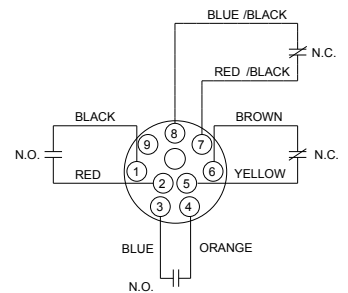
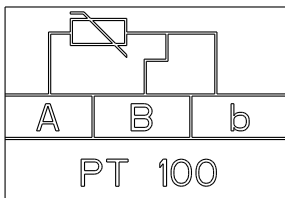
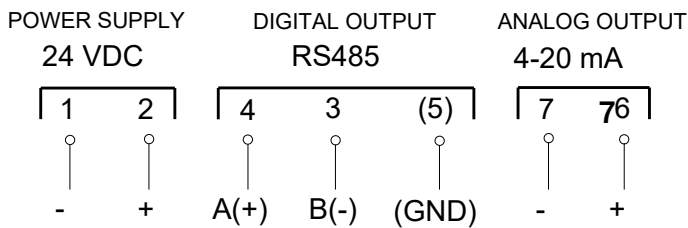


Fig.3

PT100



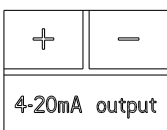
Liquid and winding temperture indicator with cable box with embedded analog and digital output



Terminals number

Supply Voltage 24 V dc	1(-) / 2(+)
Analog output 4-20 mA	6(+) / 7(-)
Modbus RTU (RS485 gate)	4 (A+) / 3 (B-)
Optional PT100	A, B, b

eOTI / eATI / eAWTI with embedded analog output with passive current loop



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Order sheet

Temperature indicators in oil / IEC

Type	
<input type="checkbox"/>	OTI (Liquid temperature indicator)
<input type="checkbox"/>	WTI (Winding temperature indicator)
<input type="checkbox"/>	eOTI (Liquid temperature indicator - eDevice)
<input type="checkbox"/>	eWTI (Winding temperature indicator - eDevice)

Output : relevant only for eDevice (eOTI and eWTI)	
<input type="checkbox"/>	Analog output (4 - 20mA)
<input type="checkbox"/>	Analog and digital output (4 - 20mA and Modbus RTU)

Mounting type	Reference page 8-9
<input type="checkbox"/>	Flange Type F
<input type="checkbox"/>	Rigid screw Type R
<input type="checkbox"/>	Elastic suspension Type ES
<input type="checkbox"/>	Back metallic sheets Type V
<input type="checkbox"/>	Flange Type Q

Scale			
<input type="checkbox"/>	-50 °C/+150 °C	<input type="checkbox"/>	0 °C/+150 °C
<input type="checkbox"/>	-20 °C/+140 °C	<input type="checkbox"/>	0 °C/+160 °C

Dial minimum division	
<input type="checkbox"/>	5° (standard)
<input type="checkbox"/>	2° (special)

Terminal board type	
<input type="checkbox"/>	Cable box
<input type="checkbox"/>	Plug-in

Number of micro switches (cable box; see page 12)	
<input type="checkbox"/>	2
<input type="checkbox"/>	4
<input type="checkbox"/>	4 with overlapping switches (see page 18)

Number of micro switches (plug-in; see page 12)	
<input type="checkbox"/>	2
<input type="checkbox"/>	3
<input type="checkbox"/>	4

Type of micro switches	Contact load
<input type="checkbox"/>	Standard AC: 250 V/5A / cosΦ=1, DC: 250 V/0.25A, 125 V/0.5A, 50 V/1A, 30 V/5A
<input type="checkbox"/>	High performances AC: 250 V/10A / cosΦ=1, DC: 250 V/0.25A, 125 V/0.5A, 50 V/3A, 30 V/10A
<input type="checkbox"/>	MBO AC/DC: 250 V/3A, 125 V/10A

Date	
Rev.	
Customer reference	

PT100	
<input type="checkbox"/>	N. 1 (3 wires) ⁽¹⁾
<input type="checkbox"/>	N. 2 (3 wires) ⁽¹⁾

(1) For eOTI/eWTI possible to choose max. 1 additional PT100 sensor

Capillary tube protection	
<input type="checkbox"/>	RILSAN (Standard)
<input type="checkbox"/>	Stainless steel AISI 304 (Optional)

Capillary length	
<input type="checkbox"/>	2 m
<input type="checkbox"/>	6 m
<input type="checkbox"/>	8 m
<input type="checkbox"/>	10 m
<input type="checkbox"/>	12 m
<input type="checkbox"/>	16 m

Bulb type (page 10)	Note
<input type="checkbox"/>	Fig.1 Female
<input type="checkbox"/>	Fig.2 Male
<input type="checkbox"/>	Fig.3 Male with well

Bulb thread (page 10)	Note
<input type="checkbox"/>	½"BSP Not for PT100, eOTI and eWTI
<input type="checkbox"/>	¾"BSP
<input type="checkbox"/>	M22x1.5 Male only; without PT100
<input type="checkbox"/>	M27x2 Male only
<input type="checkbox"/>	1"BSP Male only

Special Bulb length (thread included)	
<input type="checkbox"/>mm Without PT100 (min 80 mm)
<input type="checkbox"/>mm With PT100 (min 150 mm)

Corrosion protection	
<input type="checkbox"/>	C4 acc. to ISO 12944 (standard)
<input type="checkbox"/>	C5-M acc. to ISO 12944 (not paintable)

Dial protection

<input type="checkbox"/>	Polycarbonate (Standard)
<input type="checkbox"/>	Glass (Optional)

Date	
Rev.	
Customer reference	

Accessories

<input type="checkbox"/>	Temperature display for remote visualization C40
<input type="checkbox"/>	External trasducer MP88800 (only for OTI/WTI)
<input type="checkbox"/>	External trasducer Nokeval 6740 (only for OTI/WTI)
<input type="checkbox"/>	Power supply: DRA 18 IN 110/230 V ac/dc, OUT 24 V dc (only for external transducer Nokeval 6740, eOTI and eWTI; no External trasducer MP88800)

WTI/ eWTI – CT nominal current

<input type="checkbox"/>	1A
<input type="checkbox"/>	2A
<input type="checkbox"/>	5A

WTI /eWTI– optional values

<input type="checkbox"/> °C Specify set thermal gradient (with thermowell thickness between 2,5 and 4 mm)
<input type="checkbox"/>A Specify set nominal current for WTI & eWTI

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Order sheet

Temperature indicators in air / ANSI

Date	
Rev.	
Customer reference	

Type	
<input type="checkbox"/>	ATI (Liquid temperature indicator)
<input type="checkbox"/>	ATIw (Liquid temperature indicator for winding)
<input type="checkbox"/>	AWTI (Winding temperature indicator)
<input type="checkbox"/>	eATI (Liquid temperature indicator - eDevice)
<input type="checkbox"/>	eATIw (liquid temperature indicator for winding - eDevice)
<input type="checkbox"/>	eAWTI (Winding temperature indicator - eDevice)

Output : relevant only for eDevice (eATI , eATIw, eAWTI)	
<input type="checkbox"/>	Analog output (4 - 20mA)
<input type="checkbox"/>	Analog and digital output (4 - 20mA and Modbus RTU)

Mounting type	Reference page 8-9
<input type="checkbox"/> Flange	Type F
<input type="checkbox"/> Rigid screw	Type R
<input type="checkbox"/> Elastic suspension	Type ES
<input type="checkbox"/> Back metallic sheets	Type V
<input type="checkbox"/> Flange	Type Q

Terminal board type	
<input type="checkbox"/>	Cable box
<input type="checkbox"/>	Plug-in

Number of micro switches (cable box; see page 12)	
<input type="checkbox"/>	2
<input type="checkbox"/>	4
<input type="checkbox"/>	4 with overlapping switches (see page 18)

Number of micro switches (plug-in; see page 12)	
<input type="checkbox"/>	2
<input type="checkbox"/>	3
<input type="checkbox"/>	4

Type of micro switches	Contact load
<input type="checkbox"/> Standard	AC: 250V / 5A / $\cos\Phi=1$, DC: 250V / 0.25A, 125V / 0.5A, 50V / 1A, 30V / 5A
<input type="checkbox"/> High performances	AC: 250V / 10A / $\cos\Phi=1$, DC: 250V / 0.25A, 125V / 0.5A, 50V / 3A, 30V / 10A

Dial minimum scale division	
<input type="checkbox"/>	5° (standard)
<input type="checkbox"/>	2° (special)

PT100	
<input type="checkbox"/>	No. 1 (3 wires) ⁽¹⁾
<input type="checkbox"/>	No. 2 (3 wires) ⁽²⁾

(1) For eATI / eAWTI / eATIw possible to choose max. 1 additional PT100 sensor

Capillary tube protection	
<input type="checkbox"/>	Stainless steel AISI 304 (Standard)
<input type="checkbox"/>	RILSAN (Option)

Capillary length	
<input type="checkbox"/>	157" (4 m)
<input type="checkbox"/>	236" (6 m)
<input type="checkbox"/>	394" (10 m)

Bulb thread (page 11)		
<input type="checkbox"/>	Fig.A 7/8"-14 UNF-2A	only for type ATI / ATIw
<input type="checkbox"/>	Fig.C G1"	not applicable for type ATIw

Thermal well - optional (Page 11)		
<input type="checkbox"/>	Fig.B 3/4" NPT	only for type ATI / ATIw
<input type="checkbox"/>	Fig.D Welded DIN well	not applicable for type ATIw

Corrosion protection	
<input type="checkbox"/>	C4 acc. to ISO 12944 (standard)
<input type="checkbox"/>	C5-M acc. to ISO 12944 (not paintable)

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Dial protection

<input type="checkbox"/>	Polycarbonate (Standard)
<input type="checkbox"/>	Glass (Optional)

Accessories

<input type="checkbox"/>	Temperature display for remote visualization C40
<input type="checkbox"/>	External trasducer MP88800 (only for ATI/ATIW)
<input type="checkbox"/>	External trasducer Nokeval 6740 (only for ATI/ATIW)
<input type="checkbox"/>	Power supply: DRA 18 IN 110/230 V ac/dc, OUT 24 V dc (only for external transducer Nokeval 6740, eATI and eAWTI; and eATIW no External trasducer MP88800)

AWTI/ eAWTI – CT nominal current

<input type="checkbox"/>	1A
<input type="checkbox"/>	2A
<input type="checkbox"/>	5A

AWTI /eAWTI– optional values

<input type="checkbox"/>	Specify set thermal gradient °C (with thermowell thickness between 2,5 and 4 mm)
<input type="checkbox"/>A Specify set nominal current

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Overlapping switches



Date	
Rev.	
Customer reference	

Pointer 1	Pointer 2	Pointer 3	Pointer 4	Description (n° micro switches connected to the terminal board (pointers indication))	Select below
■	■	■	■	2 ^A + 1 + 1	
■	■	■	■	1 + 1 + 2 ^A	
■	■	■	■	2 ^A + 2 ^A	

A: Two contacts connected to the same pointer in order to have two relay outputs that switch at the same temperature

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www.comem.com

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Technical guide-09-2021